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APPLICATION FOR LETTERS PATENT

**Interactive Entertainment System For Presenting  
Supplemental Interactive Content Together With  
Continuous Video Programs**

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1 **TECHNICAL FIELD**

2 This invention relates to interactive entertainment systems, such as  
3 interactive television or interactive computing network systems. More  
4 particularly, this invention relates to methods for presenting supplemental  
5 interactive content in conjunction with continuous video programs to enable  
6 viewer interactivity with the otherwise non-interactive video programs.

7  
8 **BACKGROUND OF THE INVENTION**

9 Video content programs, such as TV shows and pay-per-view movies, are  
10 delivered to a viewer as a continuous data stream. Today, programs are most  
11 commonly distributed using a wireless broadcast system, or a cable system. In the  
12 first instance, the programs are broadcast over a wireless network and received at  
13 individual homes through an antenna or satellite dish. In the latter case, the  
14 programs are transmitted over cable to set-top boxes resident in the viewers'  
15 homes.

16 In broadcast distribution systems, there is no opportunity for interactive  
17 control of the content by the viewer. The viewer simply has an option to watch the  
18 program, change to a different program, or turn off the television. However, as  
19 consumers have learned from playing video games on their televisions, non-  
20 interactive viewing is not nearly as fun or sensory rich as interactive entertainment.

21 To enhance the traditional way of viewing television, there has been some  
22 effort toward the production of interactive programming content. As presently  
23 contemplated, additional interactive content is created to enhance the existing  
24 traditional program. This supplemental content is played along with the  
25 continuous video stream to enable viewers to interact with the program in a more

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1 involved manner than simply watching it. The supplemental content might, for  
2 example, ask the viewer questions about the episode, or play games with the  
3 viewer that relate to the show, or describe behind-the-scenes aspects of making the  
4 program. However, there remains a significant hurdle concerning how to create  
5 and distribute interactive programs.

6 Apart from the TV environment, however, computer users are familiar with  
7 interactive content on their computers. Many users own interactive multimedia  
8 CD-ROM applications that combine video, audio, pictures, text, and other content  
9 into a rich and responsive presentation. Familiar examples of interactive computer  
10 applications include games (e.g., Myst from Broderbund), educational programs  
11 (e.g., Reader Rabbit series from the Learning Company or Magic Schoolbus series  
12 from Microsoft), and home entertainment (e.g., Encarta from Microsoft).

13 Interactive content is also available from online services over a public  
14 network. Most notably, the Internet is emerging as a means for supplying video,  
15 sound, pictures, text, and other multimedia rich resources to a user's computer.  
16 Through the Internet, users can access a wide variety of resources that are  
17 maintained on computers located around the world.

18 Resources available on the Internet are most commonly presented as  
19 hypertext. "Hypertext," also referred to as "hypermedia," is a metaphor for  
20 presenting information in which text, images, sounds, and actions become linked  
21 together in a complex, non-sequential web of associations that permit a user to  
22 browse through related topics, regardless of the presented order of the topics.  
23 Hypermedia content is widely used for navigation and information dissemination  
24 on the "World-Wide Web" (WWW or Web) of the Internet. An application  
25

1 program referred to as a "Web browser" is normally used to retrieve and render  
2 hypermedia content from the WWW.

3 Despite the development of interactive entertainment in the computer  
4 sector, there has been little activity spilling over into the traditional television  
5 world. The TV environment poses a problem in that the programs are typically  
6 delivered as a broadcast of a continuous data stream, which inherently does not  
7 support interactive control. Interlacing interactive content presents a difficult  
8 design issue.

9 One proposed solution is a technology referred to as "Intercast technology"  
10 which is available from the Intericast Industry Group, a consortium of leading  
11 television networks, program hardware vendors, and software vendors. The  
12 Intericast technology presents both television programs and Internet data together  
13 on the same television or computer monitor, but with separate and predefined  
14 panes.

15 Fig. 1 shows a screen 14 (television or computer monitor) which illustrates  
16 the Intericast technology. The screen 14 is divided into panes, as represented by  
17 panes 16-18. Pane 16 contains the television program resulting from the video  
18 data. Pane 17 contains a hypermedia document, such as a Web page, that is  
19 provided by the Internet data. A third pane 18 can be used to show additional data,  
20 such as advertisements or the like.

21 The Internet data is combined with the video data of the television program  
22 to form a single signal that is broadcast to the viewer. The Internet data is  
23 transmitted during the vertical blank interval (VBI) between successive frames of  
24 the video data. The Internet data and video data are separated at the viewer's  
25 computer and presented simultaneously within their respective panes.

1 The drawback with the Intercast technology is that it rigidly adheres to the  
2 paned presentation. The television pane 16 is a self-contained pane which is  
3 dedicated to showing only the video program, and the Web pane 17 is a separately  
4 self-contained pane which is reserved exclusively for Web content. Content  
5 providers who develop the Internet data have no control over how the television  
6 program and interactive supplemental content is presented to the viewer. They can  
7 simply control how the data is presented within its own box 17. Accordingly, the  
8 content providers are significantly limited in what they can create in the way of a  
9 full interactive media event.

10 The inventors have developed a better way of creating and distributing  
11 interactive programming that frees the content providers of these restrictions.

### 12 13 SUMMARY OF THE INVENTION

14 This invention concerns an interactive entertainment system for supplying  
15 interactive supplemental content along with continuous video content programs to  
16 viewers. The programs are supplied from a program provider, such as a cable  
17 headend or a broadcast station, over a distribution network to a viewer computing  
18 unit. The programs are continuous, non-interactive data streams, such as television  
19 shows, movies, or other video content.

20 The viewer computing unit is implemented as a television, a television/set-  
21 top box unit, a personal computer, or the like. It has a processor and memory. An  
22 electronic programming guide (EPG) is stored in the memory and executable on  
23 the processor to organize programming information that is descriptive of the video  
24 content programs. The EPG maintains a data field that indicates whether the video  
25 content program is interactive. The EPG data field contains a pointer, universal

resource locator, or other target specification to the target resource that supports the interactive content and correlates this data field with the particular program that the supplemental content is designed to enhance. Accordingly, if a target resource is listed in conjunction with a particular program, the program is recognized as being interactive. The supplemental content can be developed and provided by the same provider that distributes the video content program, or by an independent service provider.

When the viewer tunes to a particular channel, the viewer computing unit consults the EPG to determine if the present program is interactive. If it is, the viewer computing unit launches an interactive support module, such as an Internet browser. This browser is kept in memory and is dynamically loadable for execution on the processor when the viewer tunes to a channel carrying a video content program that the EPG identifies as interactive. The viewer computing unit also depicts a small icon or other indicia to alert the viewer that the program is interactive. The viewer can click on or otherwise activate the icon to enter the interactive mode and display the supplemental content. As an alternative, the supplemental content can be automatically displayed in response to launching the Internet browser.

The Internet browser uses the target specification in the EPG to start the target resource. The target resource contains the supplemental content to enhance the television program. The supplemental content might be, for example, questions about the program, games, trivia information, facts about the actors and producers, information on other episodes, advertisements, a listing of products or memorabilia about the program, and so on. The supplemental content and

1 program can be transmitted together as a single signal, which is separated at the  
2 viewer computing unit, or separately over two channels or two different networks.

3 The target resource also contains display layout instructions prescribing  
4 how the supplemental content and the video content program are to appear in  
5 relation to one another when displayed on the television or monitor. When the  
6 data from the target resource is downloaded to the viewer computing unit, the  
7 processor is responsive to the layout instructions obtained from the target resource  
8 to display the supplemental content concurrently with the video content program.

9 Embedding the layout instructions in the supplemental content  
10 advantageously returns control of the presentation to the content developers. The  
11 developers can now arrange the data and video in any manner they choose. The  
12 developers are not restricted to specific fixed panes, as in the prior art.

### 13 14 **BRIEF DESCRIPTION OF THE DRAWINGS**

15 Fig. 1 is an illustration of a screen showing a paned presentation format for  
16 presenting television programs and Internet data according to prior art Intericast  
17 technology.

18 Fig. 2 is a diagrammatic illustration of an interactive entertainment system  
19 according to one implementation. The Fig. 2 implementation is representative of  
20 an interactive TV system.

21 Fig. 3 is a simplified example of data fields in a data structure maintained  
22 by an electronic programming guide.

23 Fig. 4 is a diagrammatic illustration of an interactive entertainment system  
24 according to a second implementation, which is representative of an interactive  
25 integrated PC-TV system.

1 Fig. 5 is a block diagram of a viewer computing unit according to an aspect  
2 of this invention.

3 Figs. 6 and 7 show a flow chart for operating an interactive entertainment  
4 system.

5 Fig. 8a-8c are a series of exemplary screen illustrations showing different  
6 display layouts of the video program and the supplemental content.

7 Fig. 9 is a flow chart of a method for authoring an interactive entertainment  
8 program.

### 9 10 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

11 Fig. 2 shows an interactive entertainment system 20 implemented as an  
12 interactive television (ITV) system. System 20 includes a centralized headend 22  
13 which is configured to provide continuous video content programs to multiple  
14 subscribers. These programs might include traditional broadcast TV shows,  
15 movies, games, and the like. The programs are transmitted as a continuous data  
16 stream, which is non-interactive in itself.

17 Each subscriber has a viewer computing unit 24. In the illustrated  
18 implementation, the viewer computing unit is embodied as a set-top box (STB) 26  
19 coupled to a television (TV) 28. The STB 26 receives digital video signals from  
20 headend 22 and controls which programs are displayed on the TV 28. The STB 26  
21 is controlled by the viewer through use of a panel control located on its face, or a  
22 hand held remote control unit 30. Instead of a separate STB, however, a viewer  
23 computing unit can be incorporated in the TV itself. In addition to televisions, the  
24 viewer computing unit might be implemented with other types of visual display  
25



1 units, such as a computer monitor, as is described below with respect to the Fig. 4  
2 implementation.

3 Each viewer computing unit 24 is configured to run an electronic program  
4 guide (EPG). The EPG provides an on-screen listing of various programs or  
5 program titles. The listing is organized in a predetermined arrangement that is  
6 displayed on the television. The EPG might also include other program  
7 descriptive information, including whether the program is provided in closed  
8 caption or stereo.

9 Headend 22 is interconnected to the subscribers via a distribution structure  
10 or network 32. The distribution structure 32 can be implemented in different  
11 ways. One implementation is a multi-tier network which includes a high-speed,  
12 high-bandwidth fiber optic cable network between the headend and regional  
13 distribution nodes (not shown), and conventional home entry lines, such as  
14 twisted-pair lines or coaxial cable, between the distribution nodes and viewer  
15 computing units. Other implementations include satellite communications (e.g.,  
16 DSS technologies), RF communication, or other wireless technologies. Moreover,  
17 the network can be constructed using a combination of wireless and wire-based  
18 technologies.

19 In the illustrated implementation, the network 32 provides both the pipeline  
20 for distribution of programs from the headend to the subscriber, as well as a back  
21 channel which enables communication from the subscriber to the headend. The  
22 back channel permits the viewer to send requests and instructions to the headend to  
23 facilitate interactive control.

24 Headend 22 provides video content programs to the viewer computing unit  
25 24. The programs are embodied as video data streams that are transmitted from

headend 22 over distribution structure 32 to the viewer computing unit. The headend maintains a database of programs 40 that can be served by a continuous media server 42 to individual viewers in an on-demand mode. The headend can also retransmit to its subscribers broadcast video signals that it receives from another source, such as a satellite feed or another cable system. The video data streams are sent to the viewer computing units in digital or analog format.

An EPG server 44 is provided at headend 22 to serve the programming information needed by the EPG at the viewer computing unit 24. The EPG server 44 is implemented as a structured query language (SQL) database 46 with records containing information relating to available shows or programs.

The headend 22 further includes an enhanced content server 52 which serves supplemental interactive content to the viewer computing units to enhance or supplement the continuous video streams served by the continuous media server 42. The supplemental content is stored digitally in database 54 and can be text, graphics, video, picture, sound, or other multimedia types. Examples of supplemental content include trivia questions or games related to the program, advertisements, merchandise or other memorabilia, hyperlinks to similar programs of similar type or starring the same actor/actress, and so on.

In the implementation described herein, the supplemental content is constructed as a hypertext file which is rendered by a browser. Hypertext, or hypermedia, is a metaphor for presenting information in which text, images, sounds, and actions become linked together in a complex, non-sequential web of associations that permit a user to browse through related topics, regardless of the presented order of the topics. Hypermedia content is widely used for navigation

and information dissemination on the “World-Wide Web” (WWW or Web) of the Internet.

Hypermedia content is commonly organized as documents with embedded control information. The embedded control information includes formatting specifications, indicating how a document is to be rendered by the browser. In addition, such control information can include links or “hyperlinks,” which are symbols or instructions telling the browser where to find other related documents on the Internet. A hyperlink includes a label, which is typically rendered as a graphical icon or as highlighted keywords, and an underlying target specification. The target specification is set forth in the underlying hypermedia document, but is normally invisible to the user. The target specification unambiguously identifies a targeted document or resource, specifying the name of the computer on which the document resides and the complete file name of the document.

In concept, the target resource can be virtually any type of object—including executable programs, text or multimedia documents, sound clips, audio segments, still images, computers, directories, and other hyperlinks. In WWW documents, hyperlink targets are most often files that can reside on any computers connected to the Internet. However, a hyperlink target can also be a particular location within a document, including the document that is currently being rendered. Hypertext usage is not limited to the Internet. Various multimedia applications utilize hypertext to allow users to navigate through different pieces of information content.

Fig. 3 shows an example data structure 48 which is used by the EPG database 46 to organize programming information and to correlate target specifications with the programs. The data structure includes a number of data





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1 that the target resources can be embedded within other text-based data held in  
2 other data fields 50 which also relate to the corresponding programs.

3 The same or a subset of data structure 48 is employed at the EPG  
4 application running at the viewer computing unit in the home. The data records  
5 stored at the headend on the EPG server are transmitted periodically in batch, or  
6 individually, and cached at the local EPG. The local EPG is thus able to identify  
7 whether a particular program is interactive compatible by quick reference to the  
8 locally cached EPG data structure.

9 Fig. 4 shows an interactive entertainment system 60 according to a second  
10 implementation which accommodates third party independent service providers.  
11 Interactive entertainment system 60 includes headend 22 which supplies programs  
12 and supplemental content to a viewer computing unit 62. In this implementation,  
13 the viewer computing unit 62 is implemented as a computer 64 with a monitor 66,  
14 a central processing unit 68, a keyboard 70, and a mouse 72 (although other input  
15 devices can be used in addition to, or instead of, the keyboard and mouse).

16 The headend 22 serves the programs over a first network 74, which may be  
17 implemented like the fiber optic distribution structure described above, or as a  
18 satellite system or other wireless broadcast system, or as a conventional data  
19 network. It is noted that other program providers may be used instead of a  
20 headend, such as a broadcast station or an online service provider.

21 The interactive entertainment system 60 also includes multiple independent  
22 service providers (ISPs), as represented by ISP 80, which distribute digital content  
23 to the viewer computing unit 62 over a second network 82. An example of the  
24 second network 82 is a public network, such as the Internet. The ISP 80 has a host  
25 84 and a content database 86 to serve various multimedia content to the viewer's

1 computer. The ISP host 84 stores one or more target resources that can be  
2 rendered by the viewer computing unit 62.

3 The supplemental content provided by the ISP 80 is correlated with the  
4 programs by data structure 48 as described above. As shown in Fig. 3, the data  
5 field 58 includes target specifications to supplemental content provided by servers  
6 other than the program provider which distributes the show. In the illustrated  
7 example, the programs Seinfeld and Star Trek have associated ISP-served content  
8 which are located by the hyperlink URLs in corresponding data field 58. It is  
9 further noted that a program might have more than one source of supplemental  
10 content. The program record for "Star Trek" has two associated target  
11 specifications, one that references a target resource at the host computer  
12 "www.fox.com" and one that references a target resource at the host computer  
13 "www.collections.com."

14 According to this Fig. 4 arrangement, the viewer computing unit 62  
15 receives a non-interactive, continuous video stream from the headend 22, and  
16 supplemental interactive content from either the headend 22 or from an  
17 independent service provider 80. The supplemental content might therefore be  
18 carried to the viewer's computer over the same channel as the program, over a  
19 separate channel, or over a separate connection unrelated to the program channels.  
20 The back channel for facilitating interactive control is provided through either  
21 network 72 or 82.

22 In another implementation, the interactive content can be supplied locally  
23 by a storage medium, such as a CD-ROM. Suppose, for example, a content  
24 developer creates an interactive CD-ROM that can be played along with a  
25 particular movie. The supplemental content is accessed via disk reads to the local







1 EPG data structure 48 to determine if the program being carried on the selected  
2 channel at this time is interactive (step 152). As described above, the presence of a  
3 target specification in the EPG data field 58 in association with the program is, in  
4 indication that the program is interactive-compatible and that there is supplemental  
5 content for the program. If the data field is empty, indicating that no supplemental  
6 content exists (i.e., the "no" branch from step 154), the viewer computing unit  
7 simply displays the video data stream being received through the tuner 98 (step  
8 156).

9 A run-time technique can alternatively be used for detecting whether a  
10 program is interactive compatible. Rather than checking the EPG data field, the  
11 viewer computing unit checks a dedicated channel for the existence of new  
12 supplemental content data. The dedicated channel is separate from the selected  
13 channel carrying the program so that the supplemental content is received by the  
14 viewer computing unit currently with the program video data. The existence of a  
15 supplemental content data stream over the dedicated channel indicates that the  
16 program being received on the selected channel is interactive compatible. This  
17 technique can be carried out without reference to the EPG listing.

18 If the program is interactive compatible (i.e., the "yes" branch from step  
19 154), the viewer computing unit retrieves the target specification from the EPG  
20 data structure (step 158 in Fig. 6). The target specification might be a pointer to a  
21 memory location at the headend, or a pointer to a memory location on a locally  
22 running CD-ROM, or a hyperlink to a target resource located at an independent  
23 service provider. The hyperlink browser 106 is loaded onto the processor to render  
24 the target resource referenced by the target specification (step 160).  
25



1 This leads to another approach to invoking the supplemental content.  
2 Rather than displaying an icon and waiting for input from the viewer, the viewer  
3 computing unit can automatically activate the target resource as soon as the  
4 browser is loaded on the processor (step 170 from the "automatic" branch from  
5 step 160).

6 The target resource contains digital data which supports interactive  
7 functionality in conjunction with the associated video content program. The  
8 digital data defines the supplemental content to enable viewer interactivity with the  
9 video content program. The digital data also defines a display layout prescribing  
10 how the supplemental content and the video program are to appear in relation to  
11 one another when displayed on the screen.

12 The digital data further defines timing information to synchronize  
13 presentation of the supplemental content with the video content program. This  
14 timing information can be implemented in many different ways. One approach is  
15 to coordinate the supplemental content to a particular program start time, and then  
16 carefully measure time from that start time to synchronize presentation of the  
17 supplemental content with the appropriate points in the program. Another  
18 approach is to characterize the program in terms of frames, and key the  
19 introduction of supplemental content to the frame numbers.

20 The video stream and supplemental content can be transmitted together, as a  
21 single signal, or separately. In the former implementation, the digital data is  
22 packaged with the video stream and transmitted as one signal from the headend.  
23 The viewer computing unit receives the single signal at tuner 98 and separates the  
24 digital data from the video signal (steps 172 and 174). In the latter  
25 implementation, the video data stream is received over the selected channel via

tuner 98 from the program provider (step 172). The digital data is received from the target resource that is activated by the browser (step 174). This target resource might be located at the headend, in which case, the data is received over a separate channel using tuner 100; or the target resource might be served by an independent service provider, in which case, the data is received over a public network using the modem 100.

At the viewer computing unit, the digital data is deconstructed to extract the timing information and the display layout from the supplemental content (step 176 in Fig. 6 and step 178 in Fig. 7). The display layout defines a program boundary within which the program is displayed to the viewer. The program boundary is sized and shaped according to parameters prescribed in the display layout. As the size and shape changes, the processor scales the video data for display within the program boundary at that instance (step 180 in Fig. 7).

The display layout also defines how the supplemental content is illustrated along with the program. The display layout prescribes the size, style, location, and other parameters for presenting the supplemental content. For instance, the supplemental content might be at least partly overlaid on the video program, or provided as a wrapper around, or along side, the program. The supplemental content is displayed according to this display layout and synchronized to the program according to the timing information (step 182 in Fig. 7). As an example, the supplemental content might be a trivia game which quizzes the viewer as to possible outcomes of various scenes. The questions are displayed on the screen according to the display layout and are timed using the timing information to coincide with the part of the program to which the questions pertain.

1 Fig. 8b illustrates a screen 200 that is part of the interactive mode. Here,  
2 the video program is constrained within a program boundary 210 which is less  
3 than full-screen size. The program boundary 210 has been reduced in comparison  
4 to the full-size presentation of Fig. 8a to make room for the supplemental content.  
5 In this illustration, the supplemental content consists of a main menu having soft  
6 buttons 212-221, a highlighter or cursor icon 224, graphics bars 226, and a text  
7 block 228 to hold the program title. The soft buttons 212-221 present various  
8 control options to the viewer to invite interactive involvement with the program.

9 The illustrated screen is taken from an interactive program based on a Star  
10 Trek episode. To provide an example of the main menu, the soft buttons 212-216  
11 represent actions for calling up related TV shows and movies. For instance, button  
12 212 relates to the original Star Trek series; button 213 concerns The Next  
13 Generation series; button 214 represents the Deep Space Nine series; button 215  
14 represents the Voyager series; and button 216 relates to the various motion  
15 pictures.

16 Soft button 217 is an access/classified toggle which allows selection of one  
17 of two levels of interactivity. "Access" serves as a default mode of interactivity  
18 which contains the main menu functionality. The screen of Fig. 8b is an example  
19 of the access mode of interactivity. A voice-over narrative announces the mode  
20 when selected by button 217. Once in the access mode, the broadcast video stream  
21 is shrunk to fit within the smaller program boundary 210 to accommodate the main  
22 menu graphics. The alternate mode of interactivity, or "classified" mode, contains  
23 time-linked contextual information to provide a second tier of information. Fig.  
24 8c, shown below, is an example of the classified mode of interactivity.  
25

Soft buttons 218-220 enable selection of different types of supplemental content. Button 218 relates to an encyclopedia containing numerous facts and information about the program. In the Star Trek program, for example, the encyclopedia might contain information on aliens, behind-the-scenes tidbits, cast and crew biographies, facts on other episodes, interviews with the actors/actresses, a technical manual explaining intricacies of starship operation and travel, and various timelines.

Button 219 is associated with a program guide, which provides a listing of current Star Trek shows for a two week period. The program guide also permits the user to change channels to another channel carrying a Star Trek show, if available.

Button 220 allows selection of entertainment content, which includes trivia games related to the program and a merchandise catalog. The trivia games segment allows viewers to compete against other regional competitors. The catalog lists available merchandise related to the program that can be purchased by the viewer.

The tenth button 221 is a quit button which allows the viewer to leave the interactive mode and return to a full-screen display, as shown in Fig. 8a.

The program and supplemental content are displayed as prescribed by the display layout. The digital data from the target resource, however, can dynamically change the display layout. When the display layout is changed (i.e., the “yes” branch from step 184), the viewer computing unit re-sizes and/or reshapes the program boundary 210 and location of the supplemental content to achieve the presentation envisioned by the content developer (step 186). The display layout can be changed for various reasons. The display layout might

change in response to viewer selection of a soft button, as is the case causing the display layout change between Figs. 8b and 8c. The display layout might also be altered automatically as part of the timing information. For instance, the digital data might invoke a graphic or text to pop up on the screen at a timely point in the program. Such real-time content includes, for example, trivia questions, interesting facts, graphical or sound effects, and so forth that relate to specific parts of the program.

Fig. 8c shows the screen 200 at another instance after the viewer has selected soft button 220 to enter into a classified mode of interactivity. The main menu is still present on the screen, but more contextual information is added in a graphical format to represent an extension of the selected soft button 220. The program boundary 210 is further reduced to accommodate the additional graphical and textual information.

In this illustration, the viewer has selected the entertainment button 220 to display the merchandise store. This layout places the video program box 210 in the lower right hand corner of the screen, and leaves the remaining area of the screen to be used for supplemental content. The supplemental content comprises a secondary menu having actuatable soft buttons 232-237. The cursor symbol 224 is movable among the various buttons and used to activate a selected button. The buttons correspond to various types of merchandise, such as clothes, posters, collectibles, memorabilia, and toys. There is also an order button 237 that permits the user to place an order for a particular product. A picture window 240 is arranged beside the secondary menu to show a picture of the merchandise associated with the category indicated by the cursor symbol 224. A merchandise



The system and method for presenting interactive entertainment programs is advantageous as it returns the freedom of creativity to the content developer. By embedding the display layout instructions within the digital data provided by a target resource, the developer is empowered to create both the content and the presentation format of how the content and broadcast program are displayed to the viewer. The developer is free to control the location and shape of the broadcast program window, as well as the presentation format of the supplemental content relative to the program window. This facilitates a non-restrictive environment in which the developer can create screens with optimal appeal to the viewer. No longer is the developer simply developing content to be displayed within a fixed pane that cannot be dynamically altered relative to the program.

The creative power is thus placed in the hands of the target resource author. Fig. 9 shows a method for authoring an interactive entertainment program. The author begins by developing the supplemental content which is to accompany a particular television show or movie (step 250 in Fig. 9). The author designs the presentation format for each scene of the program (step 252), and the timing requirements for synchronizing the supplemental content with the broadcast video stream (step 254).

In the implementation described herein, the supplemental content is constructed as a hypertext document which can be rendered by a browser. To control how the content is to be rendered, the author encodes the presentation format and timing instructions as extension attributes to hyperlink codes. More specifically, hypermedia content utilized by the WWW is commonly written using

1 what is referred to as a "markup language." "SGML" (Standard Generalized  
2 Markup Language) is one such language, defined formally as "a language for  
3 document representation that formalizes markup and frees it of system and  
4 processing dependencies." SGML is a language for describing the structure of  
5 documents and for describing a tagging scheme to delineate that structure within  
6 text. For creating hypermedia content, WWW documents utilize a subset of  
7 SGML called "HTML" (Hypertext Markup Language). An HTML textual  
8 document can be thought of as plain text that contains formatting instructions in  
9 the form of HTML markup codes or "tags." Tags tell Web browsers how to render  
10 and print documents, and are also used to specify hyperlinks.

11 The following is a simple example of a start tag for an HTML hyperlink:

12  
13 `<A HREF="http://www.microsoft.com/upgrades">`

14  
15 The leading "A" in the start tag is the name of HTML element. The letter  
16 "A" indicates that the tag is an "anchor" tag—the type of tag that defines a  
17 hyperlink. The start tag contains an "attribute" indicating a target specification:

18  
19 `HREF="http://www.microsoft.com/upgrades".`

20  
21 The attribute name is "HREF" and the attribute value is  
22 "http://www.microsoft.com/upgrades." HTML documents are organized  
23 according to various tags. Tags define the start and end of headings, paragraphs,  
24 lists, character highlighting and links, and so on.  
25

The interactive entertainment system described herein supports conventional HTML documents as target resources. Accordingly, authors can use familiar HTML elements, such as Head, Body, and Character-Level elements, to construct a target resource. However, the inventors have also developed new types of tags, as well as extension attributes to existing HTML tags. The author of a target resource can use the new tags and extension attributes to formulate how and when the browser renders the supplemental content along with the continuous video stream. The new HTML extension attributes are given below in Table 1.

**Table 1: HTML Extension Attributes**

HTML Tag	Extension Attribute	Function
BODY	background	Specifies a URL for an image tile or MMS stream to cover the document background to yield a distinctive appearance.
IMG	dynsrc	Specifies the address of a video clip or broadcast source to be displayed.
FRAMESET	usedefault	Used to determine where the focus is located in a tab-based user interface within a FRAME by specifying the URL for the file containing the map, followed by a '#', followed by the name of the USEDEFAULT. If the argument to USEDEFAULT starts with a '#', the map is assumed to be in the same document as the USEDEFAULT tag

The new tags supported by the interactive entertainment system are provided in Table 2.

**Table 2: HTML Tags**

HTML Tag	Function	Permitted Attributes
ACTION	Controls update or display of sound or picture	<u>CELL</u> —identifies object in a GALLERY <u>HREF</u> —URL to resource or object <u>ID</u> —label or id for this element <u>TARGET</u> —where to perform action such as a FRAME or RENDERIMAGE element
EVENT	Associates trigger and action	<u>TRIGGER</u> --reference to TRIGGER element to be used with this event <u>ACTION</u> --reference to TRIGGER element to be used with this event - allow comment delimited list of actions to satisfy the need for multiple actions in response to a single trigger <u>ID</u> —name of event
GALLERY	Stores and coordinates collection of images	<u>SOURCE</u> —URL to actual graphic <u>ID</u> —name of gallery <u>ROWS</u> —height of each graphic cell <u>COLUMNS</u> —width of each graphic

		cell <u>TRANSPARENCY</u> —RGB value indicating background color
LOADFONT	Downloads and installs a font to be used	<u>HREF</u> - URL to font resource
RENDERIMAGE	Displays an image from the GALLERY	<u>REF</u> —name of GALLERY <u>CELL</u> —specifies individual cells containing image
TRANSITION	Defines screen change interim, fade to black, cut, and so on.	<u>TYPE</u> —type of transition <u>SPEED</u> —how fast does the transition occur, SLOWEST, SLOW, MEDIUM, FAST, FASTEST
TRIGGER	Defines when something is to occur	<u>ID</u> —name of this TRIGGER <u>TIME</u> —time in milliseconds since the last event

Using the supplemental content and HTML tags for timing and presentation format, the author constructs the target resource (step 256 in Fig. 9). The target resource is stored in a storage medium at a host computer and a target specification for referencing that location is defined (step 258). The author submits the target specification to the authority responsible for developing the programming information maintained in the EPG database. The target specification is stored in

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1 the appropriate data field of the EPG data structure which corresponds to the  
2 program to which it pertains (step 260).

3 In compliance with the statute, the invention has been described in language  
4 more or less specific as to structure and method features. It is to be understood,  
5 however, that the invention is not limited to the specific features described, since  
6 the means herein disclosed comprise exemplary forms of putting the invention into  
7 effect. The invention is, therefore, claimed in any of its forms or modifications  
8 within the proper scope of the appended claims appropriately interpreted in  
9 accordance with the doctrine of equivalents and other applicable judicial doctrines.